

Unsuccessful Medical School Applicants as a Potential Health Manpower Resource

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RECENT DECADES HAVE WITNESSED an enormous growth in the population's demand for medical services, with concomitant strain on the country's health manpower resources. It is now widely believed that available numbers of health personnel (both present and projected levels) are not sufficient to deliver an optimal level of health care (1-4). While studies often concentrate on physician supply and productivity (5,6), far greater shortages exist (and are anticipated) in other health occupations (7,8).

The wide range of health-related activities is illustrated by a Public Health Service publication (9) specifying about 125 health professions and occupations. Weiss (10) has described nine "job families," four directly concerned with patient care (mental health, nursing, medical, and dental care), and five outside direct care (technical and laboratory, administration and planning, data

processing, environmental health, and health research).

The National Commission on Community Health Services' Task Force on Health Manpower

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(8a) has recommended that "Government at all levels, educational institutions, health agencies, and professional and occupational groups should undertake positive measures to recruit health personnel from special groups that have not been fully tapped." We believe that unsuccessful applicants to medical schools represent a highly relevant, but as yet relatively untapped, reservoir of potential health manpower.

The yearly acceptance rate of U.S. medical schools has remained fairly constant, at about 50 percent over the past 40 years (11). In 1966 (the year on which the present study is based), this rate meant that only 9,123 of the 18,250 persons who applied for admission were accepted (12). Subsequent acceptance rates fell to a low of 43 percent in 1969 and rose to only 46 percent in 1970. Thus, each year substantial numbers of persons cannot continue formal training toward their occupational goals, and most must then undergo another career decision process.

Additionally, medical school rejectees are unique in terms of important academic and psychosocial characteristics. While only 60 percent of the students who enter college graduate (13), almost all rejectees ultimately receive an undergraduate degree. Several large studies of college students planning careers in medicine also indicate that these persons are likely to rate high on various desirable indicators, such as academic performance (14,15) and "people-oriented" occupational values (14, 16, 17). Indeed, Goldhaber (18) argues that a combination of seven ideological, demographic, and social factors beyond the control of the rejectee (such as the baby boom, growth in numbers of paraprofessionals, or recruitment of more members of minority groups) accounts for what he feels is a rising rejection rate for increasingly more-qualified applicants.

Moreover, the rejectees had aspired to a highly specialized professional career in health care delivery and prepared for that future by making certain investments or "side-bets" (19), such as concentrating on the hard sciences and taking particular prerequisite college courses. For example, in 1966 approximately 47 percent of the applicants took an undergraduate major in the biological sciences, 18 percent in the physical sciences, chemistry, or mathematics, and 18 percent majored in premedical courses (12).

To date, there has been no cross-national, systematic study of the professional and personal

experiences of unsuccessful medical school applicants. Such information should be helpful to a variety of groups in the following ways:

1. Health manpower planners and legislators would be able to estimate both the number of persons with particularly relevant undergraduate training who might be interested in a career in health care and the kinds of support and rewards necessary to motivate these persons to enter health-related areas.

2. Researchers in medical education could similarly estimate the amount and types of training that would have to be provided to prepare the rejectees for health work.

3. Premedical and other undergraduate advisers would learn the fates of those who had unsuccessfully applied to medical schools and might be able to offer them more useful career suggestions based on the applicants' reported interest in other health fields.

4. Unsuccessful applicants themselves might benefit from learning about alternative career paths taken by fellow rejectees.

Methods

Sample selection. To study career patterns and expectations, it was necessary to allow sufficient time to pass between medical school rejection and the present survey so that military service would have been completed or other occupational choices would have been made. However, the more distant the year of rejection, the lower the possibility of reaching the respondents. The investigators believed that sampling applicants to the entering class of 1966-67 represented the best compromise; it was assumed that most of these persons had taken the Medical College Admission Test (MCAT) in May or October of 1965.

Through the cooperation and assistance of the Association of American Medical Colleges (AAMC), the researchers obtained a list of persons who completed the MCAT in 1965, as well as a list of those who matriculated in the 1966-67 freshman medical school class. Removal of the names that were duplicated on both lists from the "matriculated" list resulted in a reasonably accurate sampling frame of unsuccessful applicants from which 164 men and 163 women were selected by stratified (on sex and geographic region) random procedures.

Data collection and sample description. In the spring of 1971, post cards were mailed to the 1965 addresses of the 327 prospective respondents

informing them of the study and its purposes and requesting their assistance in completing the questionnaire that would follow. This technique was used to enhance the likelihood of respondent cooperation and, as a relatively inexpensive device, to obtain change-of-address information; it yielded 105 names of persons who no longer resided at the 1965 address, and for whom no forwarding address was available.

Questionnaires were mailed to the remaining 222 persons, and 152 replied—a response rate of 68.5 percent. Unfortunately, 27 respondents had never applied to medical school even though they had taken the MCAT, and another 27 respondents had been accepted by a U.S. medical school in 1966, representing possible computer error in the list-subtraction technique mentioned earlier. These 54 respondents were dropped from the study, leaving 98 questionnaires deemed usable for analysis. The final sample consisted of 57 men and 41 women.

Data from AAMC computer listings permitted comparisons between the 98 respondents studied and the 70 nonrespondents. These two groups did not differ significantly by age and sex distributions, by whether or not they had taken the MCAT before the sample year, or by MCAT performance. Similar comparisons of respondents' mean scores with those of all unaccepted applicants also indicated that the respondents were a fairly representative sample of all unaccepted applicants.

Results

College years. A majority of the male (58 percent) and of the female (78 percent) rejectees received bachelor's degrees in 1966. Most of these persons were either attending college or were recent graduates at the time of first application. The distribution of men and women in various college majors at the time of graduation was as follows:

<i>College majors</i>	<i>Men (N=57)</i>		<i>Women (N=41)</i>	
	<i>Num- ber</i>	<i>Per- cent</i>	<i>Num- ber</i>	<i>Per- cent</i>
Hard sciences.....	40	70.2	32	78.0
Health.....	2	3.5	1	2.4
Social sciences.....	6	10.5	3	7.3
Humanities.....	9	15.8	5	12.2

The hard sciences were the most frequently chosen fields. (Hard sciences include biology, chemistry,

mathematics, physics, engineering, and premedical majors; health includes medical technology, pharmacy, and nursing; social sciences include sociology, psychology, and economics; and humanities include English, art, history, and philosophy.) About 43 percent of all the respondents gave "career plans" as the most important reason for selecting their majors, while another 44 percent of the women and 35 percent of the men stated "intellectual interest in that area."

The responses to a series of questions concerning college courses in the hard sciences were as follows:

<i>Responses</i>	<i>Men (N=57)</i>		<i>Women (N=41)</i>	
	<i>Num- ber</i>	<i>Per- cent</i>	<i>Num- ber</i>	<i>Per- cent</i>
Took many courses in.....	56	98.2	41	100.0
Would take further study now.....	24	42.1	16	39.0
Have knack for.....	26	45.6	22	53.7
Found area rough going academically.....	21	36.8	10	24.4
Teachers encouraged me to go on in.....	16	28.1	19	46.3
Liked them a lot.....	43	75.4	35	85.4

The data suggest that this group of respondents had channeled most of their energies into the hard sciences and that they perceived themselves as able to achieve some measure of success in these courses. In general, a greater proportion of women than of men indicated that they liked the hard sciences a lot, believed they had a knack for such courses, and did not find them difficult academically. Moreover, women were more often encouraged by instructors to go on in the hard sciences, although they are slightly less willing than men to pursue such study at present.

Some reasons for entering medicine. As shown in the following table, most of the unsuccessful applicants received some parental encouragement toward entering medical school, although such support was more often given to sons (67 percent) than to daughters (56 percent). When the rejectees were asked how important their getting a medical education was to their parents, men more often replied "fairly" or "very" important than did women. However, only 58 percent of the total sample chose these categories, suggesting little parental pressure and enthusiasm. More men than women stated that their parents would have offered financial assistance for attending medical school, and more men (40 percent) than women (25 percent) have relatives who are

physicians. In addition, men were twice as likely as women (40 percent compared with 22 percent) to have relatives in other health occupations.

Influence categories	Men		Women	
	Number	Percent	Number	Percent
Both parents encouraged application to medical school.....	38	66.7	23	56.1
Parents felt that child's entering medical school was "fairly" or "very" important.....	35	61.5	21	52.5
Parents willing to financially support medical school education.....	47	82.5	24	58.6
Have relatives who are physicians.....	23	40.4	10	24.4
Have relatives in other health occupations.....	22	39.3	9	22.4
"Fairly" or "very" important reasons for wanting to enter medicine:				
Freedom from supervision.....	37	68.5	23	57.5
A high income.....	40	71.4	13	32.5
Parents' influence.....	18	32.2	9	22.5
Influence of relatives, friends.....	18	32.7	6	15.0
Prestige.....	42	76.4	17	44.7
Provide service.....	44	83.0	34	83.0
Opportunity to be helpful.....	50	90.9	36	90.0

From the reasons for wanting a career in medicine that were checked as "fairly" or "very" important, it is apparent that relatives and friends exerted a greater influence on male than on female rejectees. Men were more likely than women to be motivated by desires for freedom from supervision and for high income and prestige. The men and women were similar, however, in wanting a career that would enable them to provide service and to be helpful to people.

The rejection. Respondents were asked if they believed the rejection was fair or unfair; 29 percent of the men and 45 percent of the women said it was fair, while 28 percent of the women and 55 percent of the men believed it was unfair, as shown in the following table:

Perception of decision	Men (N=55)		Women (N=40)	
	Number	Percent	Number	Percent
Fair.....	16	29.1	18	45.0
Unfair.....	30	54.4	11	27.5
Do not know.....	9	16.4	11	27.5

Thus, women were significantly more likely to feel that their rejection was fair, and, based on these self-assessments, one might conclude that more women than men seemed to have anticipated being rejected.

New career choice. At the time of their medical school rejections, 34 percent of the respondents had definite plans for another occupation, and 48 percent had somewhat vague plans; only 18 percent had no plans for an alternative career. It is of interest that the making of definite plans for another career was found to be independent of attitudes concerning the rejection, such as being upset or perceiving the rejection as unfair. Thus, most persons in the sample had made some other plans for a career by the time of rejection, regardless of their expectations of being accepted.

Having made some alternate career plans was strongly related to having made concurrent applications to graduate schools and to medical schools. Approximately 85 percent of the sample applied to graduate school at some time; of these, about 98 percent were accepted and about 95 percent subsequently attended graduate school. There were no sizable differences in the percentages of men and women applying to or enrolling in graduate school. However, the following percentages of persons obtaining graduate degrees reveal that 74 percent of the men, but only 42 percent of the women, have (or expected to complete) a graduate degree. The data also indicate that 60 percent of all the rejectees went on to obtain advanced degrees.

Degree obtained	Men (N=57)		Women (N=41)	
	Number	Percent	Number	Percent
Bachelor's.....	15	26.3	24	58.5
Master's.....	11	19.3	10	24.4
Doctorate.....	31	54.4	7	17.1

Further analyses revealed that men who received graduate degrees differed from men who did not in that they had higher grades and higher scores on the MCATs. Although most family-related variables were not associated with attaining a graduate degree, mother's educational level and having a physician father were predictors of a post-baccalaureate degree, as shown in the following table. (Because the underlying distributions are not normal, and the measures are usually

at the ordinal level, gamma—a nonparametric correlation coefficient—is used as the measure of association. All gammas reported are statistically significant at $P \leq .05$, unless noted as “ns”—“not significant.”)

Characteristic	Men (N=57)	Women (N=41)
Had higher undergraduate grades.....	0.30	0.45
Had higher MCAT scores.....	.34	ns
Mother's education level.....	.44	.36
Father was a physician.....	.33	.38
Occupational values most important....	.39	ns
People-oriented values.....	-.44	ns
Interest in science.....	-.58	ns
Had close friends who studied for doctorate degrees.....	.38	.41
Advice from parents following rejection..	ns	.89
Marriage.....	ns	ns
Having children.....	ns	-.58

Men who completed graduate training were more likely to say that their occupational values, rather than their abilities, were important in their choice of a new career. Surprisingly, in terms of their reported reasons for choosing medicine, the men's people-oriented values were significantly lower than the women's, and they had little interest in science. Also, men who received advanced degrees tended to have friends who studied for doctorates.

For women, the relationship between high grades in college and later receiving a doctorate was significant, while the association between their average score on the MCAT and receiving a graduate degree was not. However, having a high score on the science portion of the MCAT was a strong predictor of a woman's studying for a graduate degree ($G=.48$).

As was the case for the men, most of the women's variables pertaining to family (including socioeconomic status) were not strongly associated with receiving a graduate degree. For women rejectees, however, obtaining advice from parents following the rejection was markedly associated with obtaining a graduate degree. Again, women as well as men were more likely to have obtained a graduate degree if they had friends who planned to receive graduate degrees. Marriage itself did not have an appreciable effect on attainment of advanced degrees, but having children was apparently a detriment to pursuing a higher degree.

The percentages of unsuccessful applicants who undertook training in various areas of graduate study were as follows:

Field of graduate study	Men (N=57)		Women (N=41)	
	Num- ber	Per- cent	Num- ber	Per- cent
Health.....	18	31.6	8	19.5
Hard sciences.....	21	36.8	15	36.6
Social sciences.....	1	1.7	3	7.3
Business or law.....	3	5.3	2	4.9
Humanities.....	5	8.8	2	4.9
Took no graduate studies..	9	15.8	11	26.8

Most rejectees tended to continue study in the hard sciences (37 percent) or health (27 percent). Given their intellectual interest in the hard sciences in college and the amount of training received in this field, these rejectees may have considered graduate study in the sciences and health as building upon their educational investment. When asked for the most important reason for choosing their specific fields, 27 percent of the men and 20 percent of the women said their “college training” was the most significant factor. Similarly, 23 percent of the men and 15 percent of the women cited their abilities as being consistent with their choices.

Far fewer respondents felt that their values, chance, or advice from friends and parents or professors were determining factors in their choice (only 14 percent checked “college adviser” as most helpful). Although such advice was not given much weight, it is interesting that most men (75 percent) sought advice following rejection, while substantially fewer women (46 percent) did so.

Ultimate career paths. The career outcomes of this sample of rejectees are summarized in the following table. Forty-eight percent of the rejectees ultimately entered health-related occupations, and an additional 17 percent were working in the hard sciences. Twelve (12 percent) of the unsuccessful applicants successfully persisted in their desire to become physicians, either through U.S. or foreign medical schools, and an additional 7 (7 percent) entered dentistry—only 2 of these 19 were women.

Career path	Men (N=57)		Women (N=41)	
	Num- ber	Per- cent	Num- ber	Per- cent
Health.....	30	52.6	17	41.5
Physician.....	10	17.5	2	4.9
Dentist.....	7	12.3	0	0
Podiatrist.....	2	3.5	0	0
Optometrist.....	1	1.8	0	0
Pharmacist.....	5	8.8	0	0
Health educator.....	1	1.8	0	0
Sanitary engineer.....	1	1.8	0	0

Medical laboratory technician.....	1	1.8	14	34.1
Medical and science writer.....	0	0	1	2.4
Pharmacologist.....	2	3.5	0	0
Hard sciences.....	11	19.3	6	14.6
Biologist.....	8	14.0	3	7.3
Chemist.....	1	1.8	3	7.3
Engineer.....	2	3.5	0	0
Other.....	16	28.1	18	43.9
Teacher.....	1	1.8	12	29.3
Business or law.....	11	19.3	1	2.4
Social scientist.....	2	3.5	3	7.3
Artist.....	1	1.8	0	0
English professor.....	0	0	1	2.4
Miscellaneous.....	1	1.8	1	2.4

The greatest losses to the areas of health and the hard sciences were the large numbers of persons who had entered education, business, or law. A comparison of the preceding two tables reveals that most women who attended graduate school to study the hard sciences have left that area; many now appear in the "health" category, do not hold graduate degrees, and are working mostly as medical or other health technologists. Indeed, more than 80 percent of female rejectees who reported their career field as "health" (34 percent of the women in the sample) were laboratory technicians.

Of the men who began graduate school in the hard sciences, many also switched to careers in health. However, only 6 percent of the male rejectees who entered health careers hold no advanced degree.

The findings that most women rejectees did not continue with the hard sciences in graduate school and that many began careers as technicians and teachers, highlight the loss of women in areas where they, themselves, professed to have competence. Data presented earlier showed that women perceived themselves as doing well in the hard sciences, and they received encouragement to continue studies in that area.

Career decision making upon rejection. Several factors may combine to account for the decision by many rejectees to embark upon careers unrelated to health. Forty-eight percent of the study sample indicated that they had not even considered entering (or training for) another health occupation after learning of their rejection, and 63 percent reported that their undergraduate professors and advisers had not suggested any health-related career alternatives to them.

That the rejectees were not very knowledgeable about various careers in health is demonstrated in the following table. A majority of the rejectees

indicated that they knew at least "a fair amount" about only 3 of 16 health-related occupations at the time of graduation from college. Women tended to be somewhat more knowledgeable than men concerning occupations which are frequently elected by women: medical technologist, dietitian, medical records librarian, medical social worker, and health educator.

Health-related occupation	Percent who knew at least "a fair amount"		
	Men (N=57)	Women (N=41)	Total (N=98)
Medical technologist.....	52.4	66.6	59.3
Pharmacist.....	53.5	53.8	53.7
Dietitian.....	19.0	30.8	24.6
Physical or occupational therapist.....	26.1	28.2	27.1
Audiologist.....	18.7	15.8	17.3
Optometrist.....	33.3	28.2	30.9
Medical records librarian.....	9.5	20.5	14.8
Clinical psychologist.....	33.3	31.6	32.5
Biomedical engineer.....	9.5	10.3	9.9
Hospital administrator.....	26.2	25.4	21.0
Medical social worker.....	10.0	15.4	12.7
Health educator.....	19.0	23.1	20.9
Medical statistician.....	9.5	10.3	9.8
Biochemist.....	52.4	56.4	54.4
Biophysicist.....	36.6	36.1	36.4
Medical social scientist.....	26.2	33.3	29.4

Possibilities for recruiting unsuccessful medical school applicants into other health-related occupations must depend partly on the degree to which characteristics of these occupations are similar to those considered by the rejectees to be important in choosing a new career. The following data indicate that these persons consider "opportunity for learning new things" as a most important job characteristic, followed by opportunity for "helping others" and for "exercising leadership." Also, men were more concerned than women with the occupation characteristics of "high income," "helping others," "high prestige," "becoming a success," and "doing practical work." Women tended more often to emphasize the characteristics "originality and creativity," "exercising leadership," "working with people," "contributing to science," and "learning new things."

Opportunity for—	Percent choosing "fairly" or "very" important		
	Men (N=57)	Women (N=41)	Total (N=98)
High income.....	70.5	61.5	63.3
Originality and creativity.....	74.1	84.6	74.3
Helping others.....	88.4	82.1	85.4
Exercising leadership.....	74.1	79.5	81.9
Working with people.....	68.8	71.8	70.3
High prestige.....	68.2	33.3	51.8
Contributing to science.....	65.9	71.8	68.6
Becoming a success.....	86.0	63.1	75.3
Doing practical work.....	72.1	63.1	67.9
Learning new things.....	90.9	97.4	94.0

Discussion

This study followed the academic and career paths of a cross-national sample of 98 students who were refused admission to the 1966–67 entering class in U.S. medical schools. Variables examined included the respondent's undergraduate major and reasons for its selection; influences of various sources in the decision to attempt a career in medicine; perceptions of the fairness of the rejection; and factors related to ultimate academic and career decisions and attainments. Important differences were found between male and female rejectees on most of these variables.

Fifty-two percent of this sample of unsuccessful applicants was lost to the health care field. All of them once wished to have a career in medicine, took substantial relevant training at the undergraduate level, and received bachelor's degrees. The finding that almost half of the rejectees did not even consider a different health career upon rejection, as well as their self-reported lack of knowledge about different health occupations and the lack of advice from professors and academic counselors concerning alternative health careers, suggests that the undergraduate guidance system is not fully aiding this ever-larger group of medical school rejectees. Information and advice on health-related occupations (for example, at the master's or doctoral level in various areas of public health) could be compiled and made relevant and available to premedical and other undergraduate advisers, with the hope of attracting more unsuccessful medical school applicants into manpower-short health fields.

One can only speculate upon the factors which may underlie the different career-choice behaviors of male and female rejectees. In general, women were more likely than men to report "having a knack for" and liking the hard sciences and were more often encouraged by their professors to enter hard science fields. Additional study data, not reported in this paper, reveal that women had significantly better undergraduate grade point averages, better grades in hard-science courses, and higher MCAT scores; however, they were far less likely than were men to take the MCAT again or to persist in reapplying to medical school.

Women were less likely than men to report parental encouragement or willingness to provide financial support and were far less interested in entering medicine in order to obtain a high income, freedom from supervision, and prestige.

However, women were much more willing to view their medical school rejection as "fair," were more likely to leave graduate school without earning a graduate degree, and were more likely to ultimately enter careers with relatively lower educational requirements and prestige.

Perhaps many women left, or did not enter, graduate training in order to support husbands who, in turn, completed their own graduate education. Such a need would help to explain the high negative correlation for women between having children and receiving a graduate degree, as well as the tendency for women not to have graduate degrees and to accept employment at relatively low levels of the health care hierarchy.

Additional study data suggest, however, that sex differences in academic and career choices are probably more strongly influenced by differences in self-perceptions. For example, respondents were asked to rate themselves along each of seven bi-polar adjective dimensions. It is evident from the following table that while the women tended to perceive themselves as somewhat more humanistic and altruistic, they were far more likely than men to view themselves as relatively unscientific, unimportant, inferior, powerless, and anomic. These findings suggest that special efforts will have to be made to encourage female rejectees to undertake training toward needed occupational roles in the health and medical care system.

<i>Adjective chosen</i>	<i>Percent choosing adjective as self-descriptor</i>		
	<i>Men (N=57)</i>	<i>Women (N=41)</i>	<i>Total (N=98)</i>
Scientific (versus unscientific)...	89.5	80.5	85.7
Important (versus unimportant)...	84.2	73.1	81.7
Superior (versus inferior).....	73.7	56.1	66.3
Powerful (versus powerless)....	52.6	36.5	46.0
In-group (versus out-group)....	48.2	39.0	43.3
Humanistic (versus materialistic).....	57.9	68.3	62.2
Altruistic (versus egocentric)...	43.9	53.7	48.0

A note of optimism comes from the rejectees' responses to a question concerning willingness to change their present career paths. While it is impossible to know how recruitable these persons might have been at the time of their rejection or college graduation, it is important to note that nearly 50 percent of the study respondents reported that if financial support were made available, they would be willing to leave their present

careers to enter training toward a doctorate in a health-related field.

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This study followed the academic and career paths of a cross-national, stratified sample of persons who were rejected by all the medical schools to which they applied. Ninety-eight rejectees completed a self-administered questionnaire which asked about the respondent's college major and abilities in the hard sciences; Medical College Admission Test (MCAT) and application patterns; influence of various sources on the decision to enter medicine; perceptions of the rejection; and factors related to subsequent academic and career decisions.

Most rejectees majored in premedicine or hard sciences.

Women were more likely than men to believe that they "had a knack" for such courses, to achieve better grades, and to receive more encouragement from their instructors to work toward a career in the hard sciences. While women had relatively better undergraduate grades and MCAT scores, they tended to view their medical school rejections as "fair" and were less likely than their male counterparts to hold positive self-perceptions, to have received parental encouragement, and to have completed graduate training.

Fifty-two percent of the un-

successful applicants ultimately entered occupations outside the health care field. Female rejectees tended to choose careers with lower educational requirements, and 82 percent of these women who entered the field of health became laboratory technicians. In general, respondents reported that they received little help in selecting alternative health careers from their college advisers at the time of rejection, and it is suggested that, with appropriate counseling, many qualified rejectees might be encouraged to undertake further training for health-related careers.